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Kit for fitting replacement hip comprises drill with shaft which fits into medullary canal of femur, distal conical bit and slanting proximal conical bit being used to widen top of canal
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Inventor: AFRIAT J; ESCARGUEL H

Patent Family (3 patents, 98 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update	Type
FR 2828397	A1	20030214	FR 200110656	A	20010809	200327	B
WO 2003015642	A1	20030227	WO 2002FR2833	A	20020808	200340	E
AU 2002337261	A1	20030303	AU 2002337261	A	20020808	200452	E

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Patent Details

Patent Number	Kind	Lan	Pgs	Draw	Filing Notes
FR 2828397	A1	FR	21	8	
WO 2003015642	A1	FR			
National Designated States,Original	AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW				
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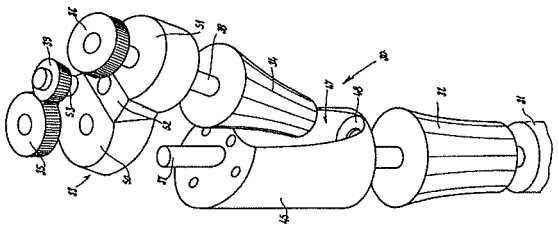
AU 2002337261	A1	EN			Based on OPI patent WO 2003015642

Alerting Abstract FR A1
NOVELTY - The kit for fitting a replacement hip comprises a drill (30) with a shaft (31) which fits into the medullary canal of the femur. A cylindrical bit is used to widen the canal and the shaft is then fed into it. A distal conical bit (32) whose axis is parallel to that of the shaft and a proximal conical bit (34) whose axis is at an angle to it are then used to widen the top of the canal.
USE - Fitting a replacement hip.
DESCRIPTION OF DRAWINGS - The drawing shows a perspective view of the drill.
30 Drill
31 Shaft for insertion into medullary canal
32 Distal conical bit
34 Proximal conical bit

Main Drawing Sheet(s) or Clipped Structure(s)



Title Terms /Index Terms/Additional Words: KIT; FIT; REPLACE; HIP; COMPRISE; DRILL; SHAFT; MEDULLARY; CANAL; FEMUR; DISTAL; CONICAL; BIT; SLANT; PROXIMITY; WIDE; TOP

Class Codes

International Patent Classification

IPC	Class Level	Scope	Position	Status	Version Date
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Original Publication Data by Authority

Australia

Publication No. AU 2002337261 A1 (Update 200452 E)
Publication Date: 20030303
ASSEMBLY FOR SETTING IN PLACE A HIP PROSTHESIS FEMORAL IMPLANT ON A FEMUR
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Priority: FR 200110656 A 20010809
Related Publication: WO 2003015642 A (Based on OPI patent)
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France

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WIPO

Publication No. WO 2003015642 A1 (Update 200340 E)
Publication Date: 20030227
ASSEMBLY FOR SETTING IN PLACE A HIP PROSTHESIS FEMORAL IMPLANT ON A FEMUR
ENSEMBLE POUR LA MISE EN PLACE D'UN IMPLANT FEMORAL DE PROTHESE DE HANCHE SUR UN FEMUR
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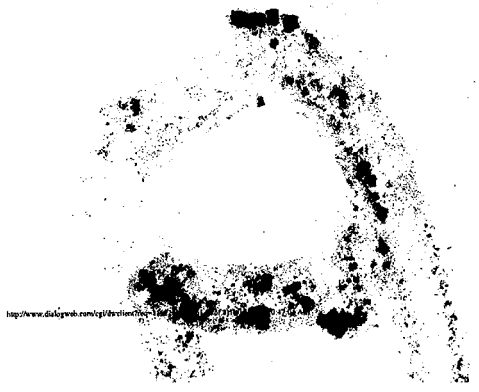
Agent: CABINET GERMAIN & MAUREAU, 12, rue Boileau, F-69006 Lyon, FR
Language: FR
Application: WO 2002FR2833 A 20020808 (Local application)
Priority: FR 200110656 A 20010809
Designated States: (National Original) AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW
(Regional Original) AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW
Original IPC: A61B-17/17(A) A61B-17/16(B)
Current IPC: A61B-17/17(A) A61B-17/16(B)
Original Abstract:
The invention concerns an assembly comprising a boring instrument (30) and the femoral implant (1) to be set in place. The invention is characterized in that the assembly comprises a cylindrical bur (16) for primary boring of the diaphyseal area of the medullary cavity of the femur (2); the diaphyseal shaft (31) of the boring instrument (30) can slide in the medullary cavity bored with said primary boring bur (16); the boring instrument (30) comprises a distal truncated bur (32), mounted coaxially to said diaphyseal shaft (31) and a proximal bur (34), and driving means (35 to 39) are provided to simultaneously drive said distal truncated bur (32) and said proximal bur (34).

Cet ensemble comprend un instrument d'alesage (30) et l'implant femoral (1) a mettre en place. Selon l'invention, l'ensemble comprend une fraise cylindrique (16) d'alesage primaire de la zone diaphysaire du canal medullaire du femur (2); la tige diaphysaire (31) de l'instrument d'alesage (30) peut coulisser dans le canal medullaire alese au moyen de cette fraise (16) d'alesage primaire; l'instrument d'alesage (30) comporte une fraise conique distale (32), montee de maniere coaxiale a ladite tige diaphysaire (31) et une fraise proximale (34), et des moyens d'entrainement (35 a 39) sont prevus pour entrainer simultanement ladite fraise conique distale (32) et ladite fraise proximale (34).



Result Page

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The present invention relates to a whole for the installation of a femoral implant of prosthesis of hip on a femur, this unit including/understanding the femoral implant on the one hand and the instruments of preparation of the bone for the installation of this implant, on the other hand.

A femoral implant of prosthesis of hip undergoes important and repeated constraints transmitted by the weight of the patient. So it must be stabilized perfectly compared to the bone, as well in rotation as in the direction of its depression compared to this bone and in swing.

The defect of stability of the implant involves, in addition to pains, a progressive embrittlement of the bone and even the appearance of secondary fractures in this last. A delicate intervention must then be operated to set up an implant ?of recovery?.

The fixing of a femoral implant by means of polymerizable cement is a traditional technique, but which is not stripped of disadvantages such as the uncertainty of the long-term behaviour of cement and necroses it osseous that the polymerization of this cement causes.

The fixing of a femoral implant by growth of the osseous cells through a porous coating makes it possible to obtain a good stability of the implant but provided that this last is stabilized perfectly compared to the bone.

On the existing femoral implants, this stability is sought by a narrow complementarity of form between the métaphysaire part of the implant and the cavity arranged in the area métaphysaire of the bone.

The installation of this cavity is carried out by means of graters which compact or file the spongy bone. The form obtained remains however relatively vague and such graters present the risk, when they are impacted with the hammer in the medullary canal of the bone, to be blocked in the cavity, to even cause a fracture of the bone in the event of weakened bone.

The inaccuracy of form of the cavity leads to a bad complementarity of form between the métaphysaire part of the implant and the cavity. It results from it from the microphone-movements from the implant which compromise the growth of the osseous cells through the porous coating and generate a risk of catch of more important play between this implant and < RTI ID=0.0> the os.< / RTI>

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To arrange a cavity of reception of a femoral implant, there is a system including/understanding a bowden shaft on which assemble one

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or several strawberries, in particular a conical distal strawberry intended to machine the femoral diaphyse and a strawberry proximale intended to machine the femoral métaphyse. The flexibility of the tree carrying the strawberries allows the clearance of the strawberry proximale compared to the distal strawberry for the boring of the internal wall of the bone.

This system does not give however satisfaction perfectly. Indeed, in the event of hard bone on the level of the aforesaid the internal wall, the flexibility of the tree leads to a risk of displacement and swing of the strawberry proximale compared to the distal strawberry, in consequence of the catch of support of this strawberry proximale against the bone and of the constraint exerted on it, which induces an action leverage. It results the risk from it to ream the internal wall of the bone according to a form which does not correspond to that of the implant to set up.

There is also a system including/understanding a conical strawberry of distal boring and a mounting base a strawberry of boring proximal. This base plate presents a distal form corresponding to the shape of the cavity arranged by the strawberry of distal boring and includes/ understands a means of guidance of the strawberry proximale according to a determined clearance, which corresponds to the volume of the cavity métaphysaire to arrange. Distal boring is carried out initially then the base plate is installation to carry out boring proximal bone.

This system also does not give fully satisfaction because of notable inaccuracy which can exist in the positioning of the base plate compared to the bone. Moreover, if the base plate is insufficiently inserted in the bone, would be this only of a few millimetres, it is impossible to insert the strawberry proximale sufficiently. This one does not start whereas the spongy bone on the level of the internal wall of the femur and cannot reach the cortical one. It results from it that the implant is private of resistant support against the cortical intern, which induces a risk of depression of this implant in the bone and/or swing of this one. If, on the contrary, the base plate is inserted too much in the bone, the strawberry proximale then will realize is an excessive boring of the bone when this one is soft, that is to say an insufficient boring when the bone is hard. In the first case, it results from it a weakening of the internal wall of the bone and even a risk of fracture of this one and in the second case an inadequacy between the machined cavity and the implant. This inadequacy causes a wedging of the implant in

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a position of insufficient depression, being able to be at the origin of a lengthening of the operated member.

The French patent application < RTI ID=0.0> N 99< /RTI> 15686, deposited in the name of the applicant, envisages a system with two instruments, of which first is engaged in the medullary canal of the femur until wedging in this channel and is used as guide with the strawberry of boring of the wall métaphysaire intern, and whose second is then engaged in the femur and is used to machine the remainder of the cavity métaphysaire.

The implant that these instruments make it possible to set up has as a disadvantage of not presenting strong guarantees of resistance to the depression in the bone.

Moreover, this existing system has as disadvantages of determining by wedging the positions of boring of the instruments, and thus to imply difficulties of withdrawal of an instrument then other, and of inducing an important risk of defect of positioning of the second instrument compared to the first. This risk induces itself a risk of inadequacy between the implant and the volume machined by the strawberries.

The present invention aims at curing these essential disadvantages.

Its principal objective is thus to provide a implantinstruments unit ensuring the implant all the guarantees of immediate and secondary stability, in particular with regard to resistance to the depression, the swing and rotation, in order to allow an installation of this implant without cement.

Another objective of the invention is to provide an implant-instruments unit eliminating the risks from wedging of the instruments in the bone and from defect of positioning of an instrument compared to another.

Another objective still of the invention is to provide an implant-instruments unit relatively easy to use and making it possible to ensure itself of a good boring of the cortical bone.

The unit concerned includes/understands, in a known way in oneself, < RTI ID=0.0> - un< /RTI>

instrument of boring equipped with a stem diaphysaire suitable to be committed in the medullary canal of the bone and with a strawberry proximale of inclined axis, laid out so as to machine the internal wall of the zone métaphysaire femur; and

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- the femoral implant to set up, which presents, a form corresponding to that of the cavity machined by means of the known as instrument.

According to the invention, - the unit includes/understands a cylindrical strawberry of primary education boring of the zone diaphysaire of the medullary canal of the femur; - the stem diaphysaire of the instrument of boring is cylindrical and present a diameter slightly lower than that of this strawberry of primary education boring, this diameter being such as this stem diaphysaire can slide in the medullary canal reamed by means of this strawberry of primary education boring; - the instrument of boring comprises a distal conical strawberry, assembled in a coaxial way with the aforementioned stem diaphysaire, which extends between the proximale end from this stem diaphysaire and the strawberry proximale, and - means of drive are designed to actuate simultaneously the aforementioned distal conical strawberry and the aforementioned strawberry proximale.

The invention thus proposes a unit including/understanding an instrument of boring equipped with a distal conical strawberry suitable to operate a boring of the bone on the level of an intermediate zone between the zone diaphysaire of the bone and the zone métaphysaire of this one. This boring forms a seat suitable to receive an intermediate portion of the implant, having a corresponding form. The arrival of this intermediate portion in support against this seat makes it possible to effectively prevent the risk of depression of the implant in the bone in the course of time.

Moreover, the whole according to the invention includes/understands one instrument of boring, equipped with two strawberries actuated simultaneously, which make it possible to machine simultaneously the aforementioned intermediate zone and the wall métaphysaire intern of the femur, and this instrument can slide in the femur until these strawberries meet the cortical bone. The boring which this instrument allows is thus carried out in only one passage; it does not imply any wedging of an instrument in the bone and removes any risk of defect of relative positioning of an instrument compared to another.

Moreover, the possibility of sliding motion of the stem diaphysaire of the instrument in the medullary canal of the bone reamed beforehand makes it possible to control the attack of the bone by the strawberries which this instrument comprises: this sliding motion is indeed continued in the distal direction until the strawberries attack the cortical bone, this attack being perceptible by the increased resistance of the instrument to the depression. The whole according to

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the invention thus makes it possible to the expert to make sure that a boring of the cortical bone is well operated, so that this boring provides to the implant solid and resistant bearing surfaces, particularly on the level of the aforesaid the intermediate zone.

The aforementioned distal conical strawberry can present a right generator; preferably however, this generator is curved, which confers on the distal strawberry a widened form, favorable to the catch of support of the implant against the bone, without marked angle.

Advantageously, the strawberry proximale and the distal conical strawberry formed and are laid out on the instrument of boring so that the generator of the strawberry proximale comes in the immediate prolongation from the generator from the distal conical strawberry.

The implant presents thus, when it is seen of face, a continuous internal edge, adapted well to the anatomy of the internal edge of the femur.

The whole according to the invention can moreover include a device of guidance of the aforesaid the primary education strawberry of boring according to a coaxial direction with the medullary canal of the femur.

This device ensures the good orientation of this primary education boring.

It preferably includes/understands a casing of centering in which a pin of guidance of the primary education strawberry of boring is assembled coaxialement, this one being canulée.

According to an embodiment preferred of the invention in this case, it casing presents a portion proximale in which spreadable teeth radially and a tapped distal portion are arranged, and - the pin presents a threaded distal portion and a bulge proximal, this bulge coming to carry the aforementioned teeth of the casing against and coming to deploy these teeth when the threaded distal portion of the pin is brought in catch with the tapped distal portion of the casing.

The teeth can present asperities taking up the challenge covered their external, suitable to fit in the wall of the bone when these teeth are deployed.

These asperities ensure the perfect immobilization of the casing compared to < RTI ID=0.0> the os< /RTI> in this position of deployment of the teeth.

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The implant presents as for him a cylindrical distal portion, of diameter corresponding to that of the stem diaphysaire of the instrument of boring, an intermediate portion and an external portion métaphysaire of form corresponding to that of the cavity machined by the distal conical strawberry, and a portion métaphysaire intern of form corresponding to that of the cavity machined by the strawberry proximale.

For its good comprehension, the invention is again described below in reference to the diagrammatic drawing annexed representative, as nonrestrictive example, an embodiment preferred of the unit that it concerns.

Figure 1 is a sight in prospect for the femoral implant which this unit includes/understands; figure 2 is a front view of this implant; figure 3 is a partial sight, in prospect, of a device of guidance which this unit includes/understands; figure 4 is a sight in prospect burst for an instrument for boring which this unit includes/understands; figure 5 is a sight of this instrument out of longitudinal section, after assembly; figure 6 is a longitudinal cross-section of a femur in the course of boring; figure 7 is a sight of this femur during a later stage of boring, and figure 8 is a sight of this femur after installation of the femoral implant.

Figures 1 and 2 represent a femoral implant 1 of prosthesis of hip intended to be set up on the higher end of femur 2 to treat, as figure 8 shows it.

This implant 1 presents a portion métaphysaire 5 widened, a portion diaphysaire 6 frayed and a portion 7 intermediary between portions 5 and 6.

Implant 1 includes/understands moreover a frayed higher part forming a femoral collar 8, whose loose lead presents a conical end 9 at weak slope. This end 9 is intended to receive a prosthetic head of spherical form (not represented).

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As figures 1 and 2 show it, implant 1 presents a cylindrical bulge 10 on its side métaphysaire external, coaxial with the portion diaphysaire 6. This bulge 10 is finished at its proximale end by a portion 11 of appreciably hemispherical form.

On its edge métaphysaire intern, in the prolongation of the widened base of collar 8, implant 1 presents a bulge 12 having the form of a portion of widened cone. The axis of this bulge 12 forms an angle of approximately 20 degrees with the axis of bulge 10.

The intermediate portion 7 with the shape of a widened cone. The largeest diameter of this portion 7 is identical to that of bulge 10 and is immediately in lower part of the lower end of bulge 10. As the figure < shows it; RTI ID=0.0> 2, < /RTI> the conformation of portion 7 is such as the generator of this portion forms, on the internal side of implant 1, an edge of appreciably continuous curve with the generator of the bulge < RTI ID=0.0> 12.< /RTI>

The smallest diameter of portion 7 is identical to that of the portion diaphysaire 6 and this portion 7 is connected at the proximale end portion 6 unresolved of continuity.

Portion 6 is cylindrical and finishes, on the distal side, by an appreciably hemispherical portion 13 of form.

Following dimensions can be indicated, as an indication, for an implant 1 of size given: - diameter of bulge 10: 29 mm; height of bulge 10: 44 mm; - height of bulge 12: 34 mm; maximum diameter of bulge 12: 23,5 mm; minimal diameter: 10 mm; - height of the intermediate portion 7: 42 mm; - diameter of the portion diaphysaire 6: 16 mm; length of this portion diaphysaire 6, except zone 13: 85 Misters.

These dimensions vary in an appreciably homothetic way for the various sizes of implant.

Figure 3 represents a device of allowing guidance 15, as that is visible on figure 6, the guidance of a strawberry 16 in femur 2. This strawberry 16 is used to carry out the primary education boring of the medullary canal on the level of the zone diaphysaire of femur 2.

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As these figures 3 and 6 show it, the device of guidance 15 includes/understands a casing of centering 20 and one pin of guidance 21.

Casing 20 is bored right through axially. It presents a portion proximale in which are arranged spreadable teeth 22 radially, these teeth 22 being individualized by bleedings arranged in the wall of casing 20, starting from the proximale end of this one. Each tooth 22 presents a pin proximal 23 taking up the challenge covered its external, radially and towards outside. Each pin 23 is relatively sharp-edged and can fit in the wall of the bone so as to ensure an immobilization of casing 20 compared to bone 2, as that will be described further.

Casing 20 also presents a tapped distal portion 24.

Pin 21 presents a distal bulge 25, a threaded distal portion 26 and one bulge proximal 27.

The distal bulge 25 is arranged after engagement of pin 21 through casing 20. This bulge 25 has a diameter higher than that of the drilling of casing 20, and thus makes it possible to assemble pin 21 with casing 20.

Bulge 25 is formed by a circular part of diameter higher than that of the drilling of casing 20, reported on pin 21 after engagement of this one through the drilling of casing 20. This bulge 25 ensures the assembly of casing 20 and pin 21 when the tapped part 24 is not in catch with the threaded part 26.

Bulge 27 is of form appreciably spherical and is interdependent of pin 21. As figures 3 and 6 show it, it is dimensioned so as to carry against the teeth 22 and to deploy these teeth 22 when the threaded distal portion 26 is brought in catch with the tapped distal portion 24 of casing 20, per screwing of pin 21 in casing 20.

Strawberry 16 is as for it of traditional type. It has a cylindrical form of diameter slightly higher than that of the portion diaphysaire 6 of implant 1 and is canulée so as to be able to be engaged and to slide on pin 21.

The instrument of boring 30 represented on figures 4 and 5 includes/understands a stem diaphysaire 31, a distal conical strawberry 32, a frame

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33, a strawberry proximale 34, two pinions 35,36 fixed on the respective trees 37,38 of drive of strawberries 32 and 34, and an intermediate pinion 39 in catch with pinions 35 and 36.

In the example of realization represented to the drawing, tree 37 is interdependent of a distal end of appreciably hemispherical form and presents an axial groove of reception of a key 40 of chock in rotation of strawberry 32 on him.

The stem diaphysaire 31 is formed by a cylindrical diameter, pipe fitting slightly lower than that of strawberry 16 and is axially reamed so as to be able to be committed on tree 37 by sliding motion, until resting against the distal end of tree 37.

Strawberry 32 introduces to a widened conical form correspondent at that of portion 7, while having dimensions slightly higher than this one. It is axially reamed so as to be able to be committed on tree 37 by sliding motion, until resting against stem 31, and presents an axial groove of reception of key 40.

Frame 33 is consisted assembly of a basic part 45 and a part 46 formant stage, these two parts 45,46 being assembled one with the other by means of screw (not represented).

The basic part 45 presents a cylindrical general form, whose diameter is slightly higher than that of bulge 10. It is bored of a boring allowing its engagement by sliding motion on tree 37, until arrival in support of its lower face against the higher face of strawberry 32.

The basic part 45 also presents a side cavity 47 formed so as to receive strawberry 34 partially. As shown in the figure 4, this cavity 47 is delimited partly lower by a circular face 48 of diameter slightly higher than the diameter of the lower end of the strawberry 34, which presents an axial boring forming a lower stage for tree 38.

Part 46 presents three parts, namely two side parts 50,51 of circular general forms and a part 52 intermediary between these two side parts 50,51.

Part 50 and 51 extend in plans forming an angle of 160 degrees between them.

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Each part 50 to 52 is bored of a boring of axis perpendicular to its plan, forming a flanged guide of trees 37,38 and a pivot 53 which pinion 39 includes/understands.

Tree 38 presents an axial groove of reception of a key 55 of chock in rotation of strawberry 34 on him. This connection can also be carried out by means of a pin.

Strawberry 34 introduces to a widened conical form correspondent at that of bulge 12, while having dimensions slightly higher than this one. It is axially reamed so as to be able to be committed on tree 38 by sliding motion, until resting against face 48, and presents an axial groove of reception of key 55.

Pinions 35,36, 39 are conical and gear the ones with the others. Pinions 35 and 36 are fixed axially compared to trees 37 and 38, for example by means of pins.

Tree 37 is connected to a means of swing drive, such as an engine 60 and tree 38 is connected in a way swivelling to a handle 61.

In practice, as the figure < shows it; RTI ID=0.0> 6, < /RTI> the device of guidance 15 is inserted in the medullary canal of femur 2 until a light wedging of casing 20. Pin 21 is then screwed in casing 20 so as to deploy the teeth 22, which causes to insert the pins 23 in the wall of bone 2 and to immobilize thus firmly device 15 compared to this wall.

Strawberry 16 then is engaged and slid on pin 21, and is used to ream the medullary canal of femur 2 according to a cylindrical form.

Pin 21 is then unscrewed and the device of guidance 15 is withdrawn.

Instrument 30 is then engaged in the femur, strawberries 32, 34 being rotated. The sliding motion of instrument 30 compared to bone 2 is continued in the distal direction until strawberries 32,34 attack the cortical bone. This attack is perceptible, at the moment when it begins, by the increased resistance of instrument 30 to the depression, which makes it possible to the expert to make sure that a boring of the cortical bone is actually operated.

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This instrument 30 thus makes it possible to arrange solid and resistant bearing surfaces whose

forms correspond precisely to those of portion 7 and bulges 10 and 12 of implant 1.

The invention thus provides an implant-instruments unit making it possible to obtain all the guarantees of resistance to the depression of the implant in the bone in the course of the time, which also eliminates the risks from wedging of instruments in the bone and defect from positioning of an instrument compared to another. The whole according to the invention is moreover relatively easy to use and makes it possible to be ensured of a good boring of the cortical bone.

It goes without saying the invention is not limited to the embodiment described above as example but that it embraces of them on the contrary all the alternatives of realization entering the field of protection defined by the Ci-annexed claims. Thus, instrument 30 can not include/understand an intermediate pinion 39, pinions 35 and 36 being directly in catch one with the other.

Abstract of **FR2828397**

The kit for fitting a replacement hip comprises a drill (30) with a shaft (31) which fits into the medullary canal of the femur. A cylindrical bit is used to widen the canal and the shaft is then fed into it. A distal conical bit (32) whose axis is parallel to that of the shaft and a proximal conical bit (34) whose axis is at an angle to it are then used to widen the top of the canal.